UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., Bldg. 1
Seattle, WA 98115

October 20, 1999

Mr. Bob Graham
Natural Resources Conservation Service
ATTN: Mr. Steve Fedje
101 SW Main Street
Portland, Oregon 97204

Re: Biological Opinion on Sauvie Island North Unit Wetlands Project

Dear Mr. Graham:

Enclosed is the National Marine Fisheries Service's (NMFS) biological opinion on the Sauvie Island North Unit Wetlands Project as described in the Natural Resources Conservation Service's Biological Assessment dated September 13, 1999. This opinion addresses Upper Willamette River chinook salmon and constitutes formal consultation for this listed species. The NMFS has determined that the subject action, as proposed, is not likely to jeopardize the continued existence of this listed species.

Sincerely,

William Stelle, Jr.
Regional Administrator

Enclosures

Endangered Species Act - Section 7
Consultation

Biological Opinion

Sauvie Island North Unit
Wetlands Project

Agency: Army Corps of Engineers, Portland District

Consultation Conducted By: National Marine Fisheries Service,
Northwest Region

Date Issued: October 20, 1999

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I. BACKGROUND

On August 11, 1999, the National Marine Fisheries Service (NMFS) received a request from the Natural Resources Conservation Service (NRCS) for Endangered Species Act (ESA) section 7 formal consultation for funding of a proposed Ducks Unlimited and Oregon Department of Fish and Wildlife wetlands restoration project on the North Unit of Sauvie Island State Wildlife Refuge, Multnomah County, Oregon. The existing wetlands are choked with Reed's canary grass (introduced exotic vegetation) which provides poor habitat for over-wintering juveniles as compared to natural vegetation. The intent of the project is to control Reed's canary grass. This would allow for reintroduction of natural wetland plants, which would be of larger benefit to juvenile salmon. In the August 11, 1999, letter, and attached Biological Assessment (BA), the NRCS determined that the Upper Willamette River chinook salmon (*Oncorhynchus tshawytscha*), listed as threatened under the ESA, may occur within the project area.

The NRCS determined that Upper Willamette River chinook salmon may be affected by the proposed project, and that the species would likely to be adversely affected. In a September 30, 1999, phone conversation, Deborah Haapala of the NRCS requested that Lower Columbia River chinook salmon (*O. tshawytscha*) also be included in the consultation. This was a result of NMFS' question as to whether the chinook salmon found on site were Upper Willamette River chinook salmon or Lower Columbia River chinook salmon.

Several meetings with the applicant, Oregon Department of Fish and Wildlife (ODFW), Ducks Unlimited, U.S. Fish and Wildlife Service and NRCS have been held to refine the proposed plan and final drawings submitted to NMFS on September 23, 1999.

Upper Willamette River chinook salmon and Lower Columbia River chinook salmon were listed as threatened under the ESA on March 24, 1999 (64 FR 14308). Critical habitat was proposed for both these species on March 9, 1998 (63 FR 11482).

The objective of this Biological Opinion (BO) is to determine whether the action to restore emergent vegetation to wetlands on Sauvie Island is likely to jeopardize the continued existence of Upper Willamette River chinook salmon and Lower Columbia river chinook salmon or destroy, or adversely modify proposed critical habitat.

II. PROPOSED ACTION

The proposed action involves placement of a water control structure at the mouth of Ruby Lake on the North Unit of Sauvies Island to maintain water levels to control Reed's canary grass in the seasonally flooded wetlands of the lake. The structure would consist of a dike, a culvert and a juvenile bypass facility in the channel draining Ruby Lake. The management plan would leave the culvert open through

the winter to allow juvenile salmon free ingress and egress from the flooded portions of the area. In March, the culvert would be closed to collect water necessary to control Reed's canary grass in the lake and the bypass facility would be placed in operation to pass juvenile salmon out of the impounded area. The water level in the lake would be maintained for 45-60 days to kill emerging Reed's canary grass. At the end of that period, the culvert would again be opened to allow for free ingress and egress of fish.

As a conservation measure, the applicant proposes to monitor the facility to measure the success of the facility's design in passing juveniles and limiting stranding rates. Natural stranding rates in this area are unknown. Two nearby additional areas (Millionaire Lake and Widgeon Lake) in the North Unit were originally proposed for the same type of facility as that proposed for Ruby Lake. However, the applicant does not intend to proceed at these two areas at this time. Rather, the applicant is proposing to monitor these two lakes in 2000 to determine the natural stranding rates of juvenile salmonids that may be occurring and to serve as a comparison to the proposed facility at Ruby Lake.

III. BIOLOGICAL INFORMATION AND CRITICAL HABITAT

The ODFW conducted studies of Ruby Lake during January and April of 1999 and collected juvenile Lower Columbia River chinook salmon and/or Upper Willamette River chinook salmon in several seine net hauls. These fish probably entered the lake during high water events and may have eventually left the lake to migrate. Based on this information, the NMFS expects that rearing juvenile Lower Columbia River chinook salmon and/or Upper Willamette River chinook salmon would be present in the area after construction is completed. The NMFS does not expect any juveniles to be present in the area during construction of the dike. The proposed action would occur within proposed critical habitat.

The action area is defined by NMFS regulations (50 CFR 402) as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." The action area is the North Unit of Sauvie Island, specifically Ruby Lake (100 acres in area) that drains into Cunningham Slough, which in turn drains into the Willamette River. The area serves as off-channel refugia and over-wintering habitat for Upper Willamette River chinook salmon. The area has also been proposed as critical habitat for Upper Willamette River chinook salmon and Lower Columbia river chinook salmon. Essential habitat features of juvenile rearing areas are: (1) Substrate; (2) water quality; (3) water quantity; (4) water temperature; (5) water velocity; (6) cover/shelter; (7) food (juvenile only); (8) riparian vegetation; (9) space; and (10) safe passage conditions (50 CFR 226). The essential features this proposed project may affect are: 1) Water temperature resulting from the lake warming in the spring; 2) potential increases in food production through better habitat conditions; and, 3) safe passage conditions as a result of the water control structure potentially impeding or delaying migration.

References for further background on listing status, biological information and critical habitat elements can be found in Federal Register 64: 14308-14328, Myers *et al.*1998; Healey 1991; ODFW and WDFW 1998, and Federal Register 63:5740.

IV. EVALUATING PROPOSED ACTIONS

The standards for determining jeopardy are set forth in Section 7(a)(2) of the ESA as defined by 50 CFR 402 (the consultation regulations). NMFS must determine whether the action is likely to jeopardize the listed species and/or whether the action is likely to destroy or adversely modify critical habitat. This analysis involves the initial steps of: (1) Defining the biological requirements of the listed species; and (2) evaluating the relevance of the environmental baseline to the species' current status.

Subsequently, NMFS evaluates whether the action is likely to jeopardize the listed species by determining if the species can be expected to survive with an adequate potential for recovery. In making this determination, NMFS must consider the estimated level of mortality attributable to: (1) Collective effects of the proposed or continuing action; (2) the environmental baseline; and (3) any cumulative effects. This evaluation must take into account measures for survival and recovery specific to the listed species' life stages that occur beyond the action area. If NMFS finds that the action is likely to jeopardize, NMFS must identify reasonable and prudent alternatives for the action.

NMFS also evaluates whether the action, directly or indirectly, is likely to destroy or adversely modify the listed species' critical habitat. The NMFS must determine whether habitat modifications appreciably diminish the value of critical habitat for both survival and recovery of the listed species. The NMFS identifies those effects of the action that impair the function of any essential feature of critical habitat. The NMFS then considers whether such impairment appreciably diminishes the habitat's value for the species' survival and recovery. If NMFS concludes that the action will adversely modify critical habitat, it must identify any reasonable and prudent alternatives available.

For the proposed action, NMFS' jeopardy analysis considers direct or indirect mortality of fish attributable to the action. NMFS' critical habitat analysis considers the extent to which the proposed action impairs the function of essential elements necessary for migration, spawning, and rearing of the listed species under the existing environmental baseline.

A. Biological Requirements

The first step in the methods NMFS uses for applying the ESA section 7(a)(2) to listed salmon is to define the species' biological requirements that are most relevant to each consultation. NMFS also considers the current status of the listed species taking into account population size, trends, distribution and genetic diversity. To assess to the current status of the listed species, NMFS starts with the determinations made in its decision to list the species for ESA protection and also considers new data available that is relevant to the determination.

The relevant biological requirements are those necessary for Upper Willamette River chinook salmon and Lower Columbia River chinook salmon to survive and recover to a naturally reproducing

population level at which protection under the ESA would become unnecessary. Adequate population levels must safeguard the genetic diversity of the listed stock, enhance its capacity to adapt to various environmental conditions, and allow it to become self-sustaining in the natural environment.

For this consultation, the biological requirements are improved habitat characteristics that function to support successful migration, rearing habitat and over-wintering refugia. Salmon survival in the wild depends upon the proper functioning of certain ecosystem processes, including habitat formation and maintenance. Restoring functional habitats depends largely on allowing natural processes to increase their ecological function, while at the same time removing adverse impacts of current practices. In conducting analyses of habitat-altering actions, NMFS usually defines the biological requirements in terms of a concept called Properly Functioning Condition and utilizes a "habitat approach" to its analysis (Attachment 1). The current status of the Upper Willamette River chinook salmon and Lower Columbia River chinook salmon, based upon their risk of extinction, has not significantly improved since the species were listed. The NMFS is not aware of any new data that would indicate otherwise.

B. Environmental Baseline

The biological requirements of Upper Willamette River chinook salmon and Lower Columbia River chinook salmon are currently not being met under the environmental baseline. Their status is such that there must be a significant improvement in the environmental conditions they experience over those currently available under the environmental baseline. Any further degradation of these conditions would have a significant impact due to the amount of risk they presently face under the environmental baseline.

The action area is the area that is directly and indirectly affected by the proposed action. The direct effects occur at the project site and may extend upstream or downstream, based on the potential for impairing fish passage, hydraulics, sediment and pollutant discharge, and the extent of riparian habitat modifications. Indirect effects may occur throughout the watershed where actions described in this opinion lead to additional activities or affect ecological functions contributing to stream degradation. Other areas of the Willamette River are not expected to be impacted by the proposed action.

V. ANALYSIS OF EFFECTS

A. Effects of Proposed Actions

The NMFS expects that the effects of the proposed project include: 1) Delay of juvenile chinook salmon during the spring migration period as a result of the pond draining at a slower rate than the naturally occurring rate; and, 2) increased stranding rates of juvenile salmonids beyond that which is naturally occurring.

Juvenile chinook salmon that may be rearing and over-wintering in the vicinity of the action area could be delayed, or prevented, from migrating by their inability to find the outfall structure. The extent of

natural stranding in the lake is unknown, but likely to be occurring. The proposed outfall structure is adequately designed to pass fish and should allow for safe passage of juveniles. The proposed dike structure is designed to prevent water from rapidly draining the lake, which would potentially delay, or prevent, migration. Due to the large area of the lake, the slow attractant flow at the bypass facility may not be readily detectable to juveniles, resulting in a delay in departure. However, it is possible that the steady out flow from the lake may actually decrease stranding of juveniles that would naturally strand when there is rapid dropping of lake levels. The proposed monitoring plan would provide answers to these unknowns.
Construction of the proposed facility during the proposed dates (prior to first inundation in December) would not result in any impact to species considered in this BO, since no juveniles would be present.

B. Effects on Critical Habitat

NMFS designates critical habitat based on physical and biological features that are essential to the listed species. Essential features for designated critical habitat include substrate, water quality, water quantity, water temperature, food, riparian vegetation, access, water velocity, space and safe passage. Critical habitat has been proposed for Upper Willamette River chinook salmon and Lower Columbia River chinook salmon. For the proposed action, NMFS expects that the project will maintain, or slightly improve, conditions in the watershed under current baseline conditions over the long term. Reed's canary grass is a highly invasive wetland plant that chokes out native vegetation. This results in a monotypical wetland that does not supply the diversity of insects and cover that is beneficial to juvenile salmonids. The alteration to a more diversified habitat will increase the diversity of insects available as prey for juvenile salmon. The variety of cover habitat will also allow juveniles to select the preferred habitat to use under varying weather conditions and water levels.

C. Cumulative Effects

Cumulative effects are defined in 50 CFR 402.02 as "those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation." Other activities within the watershed have the potential to impact fish and habitat within the action area. Future Federal actions, including the ongoing operation of hydropower systems, hatcheries, fisheries, and land management activities are being (or have been) reviewed through separate section 7 consultation processes.

NMFS is not aware of any significant change in non-Federal activities that are reasonably certain to occur. NMFS assumes that future private and State actions will continue at similar intensities as in recent years.

VI. CONCLUSION

NMFS has determined, based on the available information, that the proposed action is expected to improve habitat conditions within the action area through the habitat enhancement activity of removing Reed's canary grass. This would allow for increased over-wintering survival of juvenile chinook salmon. The NMFS believes that there is the potential for migration delay or stranding to occur, but it is unknown if it is higher than what is naturally occurring. There is also the potential that the project may actually decrease stranding rates of juvenile salmon. Although direct mortality (above naturally occurring levels) could result from this project, the NMFS expects that if it does occur, the level of mortality would be minimal and would not result in jeopardy.

Consequently, NMFS believes that the proposed action is not likely to jeopardize the continued existence of Upper Willamette River chinook salmon and Lower Columbia River chinook salmon or adversely modify proposed critical habitat. In making this determination, NMFS used the best available scientific and commercial data to apply its jeopardy analysis, when analyzing the effects of the proposed action on the biological requirements of the species relative to the environmental baseline, together with cumulative effects.

VII. REINITIATION OF CONSULTATION

Consultation must be reinitiated if: The amount or extent of taking specified in the Incidental Take Statement is exceeded, or is expected to be exceeded; new information reveals effects of the action may affect listed species in a way not previously considered; the action is modified in a way that causes an effect on listed species that was not previously considered; or, a new species is listed or critical habitat is designated that may be affected by the action (50 CFR 402.16). To reinitiate consultation, the NRCS should contact the Habitat Conservation Division (Oregon State Office) of NMFS.

VIII. REFERENCES

Healey, M.C. 1991. Life history of chinook salmon (*Oncorhynchus tshawytscha*). Pages 311-393 *In:* Groot, C. and L. Margolis (eds.). 1991. Pacific salmon life histories. Vancouver, British Columbia: University of British Columbia Press.

Myers, J.M., R.G. Kope, G.J. Bryant, D. Teel, L.J. Lierheimer, T.C. Wainwright, W.S. Grant, F.W. Waknitz, K. Neely, S.T. Lindley, and R.S. Waples. 1998. Status review of chinook salmon from Washington, Idaho, Oregon, and California. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-35, 443 p.

ODFW and WDFW. 1998. Status Report Columbia River Fish Runs and Fisheries, 1938-1997. 299 pp.

IX. INCIDENTAL TAKE STATEMENT

Sections 4 (d) and 9 of the ESA prohibit any taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct) of listed species without a specific permit or exemption. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, and sheltering. Harass is defined as actions that create the likelihood of injuring listed species to such an extent as to significantly alter normal behavior patterns which include, but are not limited to, breeding, feeding, and sheltering. Incidental take is take of listed species that results from, but is not the purpose of, the Federal agency or the applicant carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to, and not intended as part of, the agency action is not considered prohibited taking provided that such taking is in compliance with the terms and conditions of this incidental take statement.

An incidental take statement specifies the impact of any incidental taking of endangered or threatened species. It also provides reasonable and prudent measures that are necessary to minimize impacts and sets forth terms and conditions with which the action agency must comply in order to implement the reasonable and prudent measures.

A. Amount or Extent of the Take

The NMFS anticipates that the action covered by this Biological Opinion has more than a negligible likelihood of resulting in incidental take of Upper Willamette River chinook salmon and Lower Columbia River chinook salmon because of the potential to delay or strand juveniles within the lake. Effects of actions such as these are largely unquantifiable and are not expected to be measurable as long-term effects on population levels. Therefore, even though NMFS expects some low level incidental take to occur due to the actions covered by this Biological Opinion, the best scientific and commercial data available are not sufficient to enable NMFS to estimate a specific amount of incidental take to the species itself. In instances such as these, the NMFS designates the expected level of take as "unquantifiable." Based on the information in the BA, NMFS anticipates that an unquantifiable amount of incidental take could occur as a result of the actions covered by this Biological Opinion.

B. Reasonable and Prudent Measure

The NMFS believes that the following reasonable and prudent measure is necessary and appropriate to avoid or minimize take of the above species.

1. Measures shall be taken to monitor the extent of delay or stranding that is occurring in Ruby Lake and to monitor natural rates of stranding at the two other sites (Millionaire Lake and Widgeon Lake) under consideration for the same type of habitat improvement to determine the amount and extent of incidental take and identify potential ways to decrease incidental take.

C. Terms and Conditions

To be exempt from the prohibitions of section 9 of the ESA, the NRCS must comply with the following terms and conditions, which implement the reasonable and prudent measure described above. These terms and conditions are non-discretionary.

1a. The applicant shall monitor the bypass outfall structures to determine if juveniles are successfully passing through the bypass structure.

1b. The applicant shall monitor natural juvenile stranding rates at two other sites to serve as a comparison for potential stranding within Ruby Lake.

1c. The applicant shall monitor the extent of juvenile stranding within Ruby Lake.

1d. The applicant shall conduct an analysis of migration delay that may be occurring within Ruby Lake.

1e. The applicant shall supply a monitoring report of these activities to the NRCS and NMFS at the end of each migration period (no later than the end of August).

Attachment 1

The Habitat Approach

Implementation of Section 7 of the Endangered Species Act for
Actions Affecting the Habitat of Pacific Anadromous Salmonids

Prepared by the National Marine Fisheries Service
Northwest Region
Habitat Conservation and Protected Resources Divisions
26 August 1999

I. Purpose

This document describes the analytic process and principles that the National Marine Fisheries Service (NMFS) Northwest Region (NWR) applies when conducting ESA § 7 consultations on actions affecting freshwater salmon[1] habitat.

II. Background

Section 7 of the Endangered Species Act[2] (ESA) requires Federal agencies to ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of their critical habitat.[3] Federal agencies must consult with National Marine Fisheries Service (NMFS) regarding the effects of their actions on certain listed species.[4] The NMFS evaluates the effects of proposed Federal actions on listed salmon by applying the standards of § 7(a)(2) of the ESA as interpreted through joint NMFS and U.S. Fish and Wildlife Service (FWS) regulations and policies.[5] When NMFS issues a biological opinion, it uses the best scientific and commercial data available to determine whether a proposed Federal action is likely to (1) jeopardize the continued existence of a listed species, or (2) destroy or adversely modify the designated critical habitat of a listed species.[6]

The Services' ESA implementing regulations define "jeopardize the continued existence of" to mean: "...to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing

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[1] For purposes of brevity and clarity, this document will use the word "salmon" to mean all those anadromous salmonid fishes occurring in, and native to, Pacific Ocean drainages of the United States – including anadromous forms of cutthroat and steelhead trouts, and not including salmonids occurring in Atlantic Ocean and Great Lakes drainages.

[2] 16 USC §§ 1531 *et seq*.

[3] 16 USC § 1536(a)(2) (1988).

[4] A 1974 Memorandum of Understanding between NMFS and FWS establishes that NMFS retains ESA jurisdiction over fish species that spend a majority of their lives in the marine environment, including salmon. *See* Memorandum of Understanding Between the U.S. Fish and Wildlife Service, United States Department of Interior, and the National Oceanic and Atmospheric Administration, United States Department of Commerce, Regarding Jurisdictional Responsibilities and Listing Procedures under the Endangered Species Act of 1973 (1974).

[5] *See* U.S. Fish and Wildlife Service and National Marine Fisheries Service., *Endangered Species Consultation Handbook: Procedures for Conducting Consultation and Conference Activities Under Section 7 of the Endangered Species Act*. U.S. Government Printing Office, Washington, D.C. (1998).

[6] 16 USC § 1536(a)(2) (1988).

the reproduction, numbers, or distribution of that species."[7] Section 7(a)(2)'s requirement that Federal agencies avoid jeopardizing the continued existence of listed species is often referred to as the "jeopardy standard."[8] The ESA likewise requires that Federal agencies refrain from adversely modifying designated critical habitat.[9] The Services' ESA implementing regulations define the term "destruction or adverse modification" of critical habitat to mean:

> . . . a direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species. Such alterations include, but are not limited to, alterations adversely modifying any of those physical or biological features that were the basis for determining the habitat to be critical.[10]

A species is listed as endangered if it is in danger of extinction throughout all or a significant portion of its range.[11] A species is listed as threatened if it is likely to become endangered within the foreseeable future.[12] Listing a species under the ESA therefore reflects a concern for a species' continued existence—the concern is immediate for endangered species and less immediate, but still real, for threatened species. The purpose of the ESA is to provide a means whereby the ecosystems upon which listed species depend may be conserved, such that the species no longer require the protections of the ESA and can be delisted.[13] This constitutes "recovery" under the ESA.[14] Recovery, then, represents a state in which there are no serious concerns for the survival of the species.[15]

Impeding a species' progress toward recovery exposes it to additional risk, and so reduces its likelihood of survival. Therefore, in order for an action to not "appreciably reduce" the likelihood of survival, it must not prevent or appreciably delay recovery. Salmon survival in the wild depends upon

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[7] 50 CFR § 402.02 (1999).

[8] *See* M.J. Bean and M.J. Rowland, *The Evolution of National Wildlife Law. Third Edition*.Praeger Publishers, Westport, Connecticut, pp. 240, 253 & 260 (1997).

[9] 16 USC § 15536(a)(2) (1988).

[10] 50 CFR § 402.02 (1999).

[11] 16 USC § 1532(6) (1988).

[12] 16 USC § 1532(20) (1988).

[13] *See, e.g.*, 16 USC § 1532(3) (1988) (defining the term "conserve"); 16 USC § 1531 (b) (1988) (stating the purpose of the ESA).

[14] *See, e.g.*, 16 USC § 1533(f)(1) (1988) (describing the purpose of recovery plans).

[15] NMFS, *Memorandum from R.S. Waples, NMFS, to the Record* (1997).

the proper functioning of certain ecosystem processes, including habitat formation and maintenance. Restoring functional habitats depends largely on allowing natural processes to increase their ecological function, while at the same time removing adverse impacts of current practices.[16] Along these lines, the courts have recognized that no bright line exists in the ESA regarding the concepts of survival and recovery.[17] Likewise, available scientific information concerning habitat processes and salmon population viability indicates no practical differences exist between the degree of function essential for long-term survival and that necessary to achieve recovery.[18]

III. Organization of Endangered Species Act § 7 Analyses

In conducting analyses of habitat-altering actions under § 7 of the ESA, NMFS uses the following steps: (1) Consider the status and biological requirements of the affected species; (2) evaluate the relevance of the environmental baseline in the action area to the species' current status; (3) determine the effects of the proposed or continuing action on the species; (4) consider cumulative effects; (5) determine whether the proposed action, in light of the above factors, is likely to appreciably reduce the likelihood of species survival in the wild or adversely modify its critical habitat. If jeopardy or adverse modification is found, NMFS must identify reasonable and prudent alternatives to the action if they exist.

The analytical framework described above is consistent with the Services' joint ESA § 7 Consultation Handbook[19] and builds upon the Handbook framework to better reflect the scientific and practical realities of salmon conservation and management on the West Coast. Below we describe this analytical framework in detail.

A. Describe the Affected Species' Status and Define its Biological Requirements.

1. Identify the Affected Species and Describe its Status

The first step in conducting this analysis is to identify listed species, and when known, populations of listed species, that may be affected by the proposed action. Under the ESA, a taxonomic species may

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[16] Stouder et al., *Pacific Salmon and Their Ecosystems: Status and Future Options*, Chapman and Hall, New York, New York (1997).

[17] *Idaho Department of Fish and Game v. NMFS*, 850 F.Supp. 886 (D. OR 1994) (discussing NMFS' biological opinion concerning the Federal Columbia River Hydropower System).

[18] *See* 51 Fed. Reg. 19,926 (1982). In the preamble to the § 7 consultation regulations, the Services recognized that in some cases, no distinction between survival and recovery my exist, stating "If survival is jeopardized, recovery is also jeopardized...it is difficult to draw clear-cut distinctions" [between survival and recovery].

[19] *See* FWS and NMFS, *supra* note 5.

be defined as a "distinct population segment."[20] The NMFS has established a policy that describes such "distinct population segments" as Evolutionarily Significant Units (ESUs).[21] An ESU is a population or group of populations that is substantially reproductively isolated from other conspecific populations and represents an important component in the evolutionary legacy of the species.[22] In implementing the ESA, NMFS has established ESUs as the listing unit for salmon under its jurisdiction. Therefore, for purposes of jeopardy determinations, NMFS considers whether a proposed action will jeopardize the continued existence of the affected ESU or adversely modify its critical habitat.[23]

When affected species and populations have been identified, NMFS considers the relative status of the listed species, as well as the status of populations in the action area. This may include parameters of abundance, distribution, and trends in both. Various sources of information exist to define species and population status. The final rule listing the species or designating its critical habitat is a good example of this type of information. Species' status reviews and factors for decline reports may also provide relevant information for this section. When completed, recovery plans and associated reports will provide a basis for determining species status in the action area.

2. Define the Affected Species' Biological Requirements

The listed species' biological requirements may be described in a number of different ways. For example, they can be expressed in terms of population viability using such variables as a ratio of recruits to spawners, a survival rate for a given life stage (or set of life stages), a positive population trend, or a threshold population size. Biological requirements may also be described as the habitat conditions necessary to ensure the species' continued existence (*i.e.*, functional habitats) and these can be expressed in terms of physical, chemical, and biological parameters. The manner in which these requirements are described varies according to the nature of the action under consultation and its likely effects on the species.

However species' biological requirements are expressed—whether in terms of population variables or habitat components—it is important to remember that there is a strong causal link between the two: actions that affect habitat have the potential to affect population abundance, productivity, and diversity; these effects are particularly noticeable when populations are at low levels—as they are now in every

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[20] 16 USC § 1532(16) (1988).

[21] *See* 56 Fed. Reg. 58,618 (1991).

[22] R.S. Waples, *Definition of "Species" Under the Endangered Species Act: Application to Pacific Salmon*, National Marine Fisheries Service (1991).

[23] NMFS has recognized that in many cases ESUs contain a significant amount of genetic and life history diversity. Such diversity is represented by independent salmon populations that may inhabit river basins or major sub-basins within ESUs. In light of the importance of protecting the biological diversity represented by these populations, NMFS considers the effects of proposed actions on identifiable, independent salmon populations in judging whether a proposed action is likely to jeopardize the ESU as a whole.

listed ESU. The importance of this relationship is highlighted by the fact that freshwater habitat degradation is identified as a factor of decline in every salmon listing on the West Coast.[24]

Habitat-altering actions continue to affect salmon population viability, frequently in a negative manner.[25] However, it is often difficult to quantify the effects of a given habitat action in terms of its impact on biological requirements for individual salmon (whether in the action area or outside of it). Thus it follows that while it is often possible to draw an accurate picture of a species' rangewide status—and in fact doing so is a critical consideration in any jeopardy analysis—it is difficult to determine how that status may be affected by a given habitat-altering action. Given the current state of the science, usually the best that can be done is to determine the effects an action has on a given habitat component and, since there is a direct relationship between habitat condition and population viability, extrapolate to the impacts on the species as a whole. Thus, by examining the effects a given action has on the habitat portion of a species' biological requirements, NMFS has a gauge of how that action will affect the population variables that constitute the rest of a species' biological requirements and, ultimately, how the action will affect the species' current and future health.

Ideally, reliable scientific information on a species' biological requirements would exist at both the population and the ESU levels, and effects on habitat should be readily quantifiable in terms of population impacts. In the absence of such information, NMFS' analyses must rely on generally applicable scientific research that one may reasonably extrapolate to the action area and to the population(s) in question. Therefore, for actions that affect freshwater habitat, NMFS usually defines the biological requirements in terms of a concept called properly functioning condition (PFC). Properly functioning condition is the sustained presence of natural[26] habitat-forming processes in a watershed (*e.g.*, riparian community succession, bedload transport, precipitation runoff pattern, channel migration) that are necessary for the long-term survival of the species through the full range of environmental variation. PFC, then, constitutes the habitat component of a species' biological requirements. The indicators of PFC vary between different landscapes based on unique physiographic and geologic

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[24] *See, e.g.*, 57 Fed. Reg. 14,653 (April 22, 1992) (Snake River spring/summer and fall chinook); 62 Fed. Reg. 24,588 (May 6, 1997) (Southern Oregon/Northern California coho); 63 Fed. Reg. 13,347 (March 18, 1998) (Lower Columbia River and Central Valley steelhead).

[25] *See* NMFS, *Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale* (MPI) (1996).

[26] The word "natural" in this definition is not intended to imply "pristine," nor does the best available science lead us to believe that only pristine wilderness will support salmon. The best available science does lead us to believe that the level of habitat function necessary for the long-term survival of salmon (PFC) is most reliably and efficiently recovered and maintained by simply eliminating anthropogenic impairments, and does not usually require artificial restoration. *See* Rhodes et. al., *A Coarse Screening Process for Potential Application in ESA Consultations*. Columbia River Inter-Tribal Fish Commission, Portland, Oregon, pp. 59-61, (1994); National Research Council, *Upstream: Salmon and Society in the Pacific Northwest. National Research Council*, National Academy Press, Washington, D.C., p. 201 (1996).

features. For example, aquatic habitats on timberlands in glacial mountain valleys are controlled by natural processes operating at different scales and rates than are habitats on low-elevation coastal rivers.

In the PFC framework, baseline environmental conditions are described as "properly functioning," "at risk," or "not properly functioning." If a proposed action would be likely to impair[27] properly functioning habitat, appreciably reduce the functioning of already impaired habitat, or retard the long-term progress of impaired habitat toward PFC, it will usually be found likely to jeopardize the continued existence of the species or adversely modify its critical habitat or both, depending upon the specific considerations of the analysis. Such considerations may include for example, the species' status, the condition of the environmental baseline, the particular reasons for listing the species, any new threats that have arisen since listing, and the quality of the available information.

Since lotic[28] habitats are inherently dynamic, PFC is defined by the persistence of natural processes that maintain habitat productivity at a level sufficient to ensure long-term survival. Although the indicators used to assess functioning condition may entail instantaneous measurements, they are chosen, using the best available science, to detect the health of underlying processes, not static characteristics. "Best available science" advances through time; this advance allows PFC indicators to be refined, new threats to be assessed, and species status and trends to be better understood. The PFC concept includes a recognition that natural patterns of habitat disturbance will continue to occur. For example, floods, landslides, wind damage, and wildfires will result in spatial and temporal variability in habitat characteristics, as will anthropogenic perturbations.

B. Evaluate the Relevance of the Environmental Baseline in the Action Area to the Species' Current Status.

The environmental baseline represents the current basal set of conditions to which the effects of the proposed or continuing action would be added. It "includes the past and present impacts of all Federal, State, or private activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early § 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process."[29]

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[27] In this document, to "impair" habitat means to reduce habitat condition to the extent that it does not fully support long-term salmon survival and therefore "impaired habitat" is that which does not perform that full support function. Note that "impair" and "impaired" are not intended to signify any and all reduction in habitat condition.

[28] Running water.

[29] *See* 50 CFR § 402.02 (1999) (definition of "effects of the action"). Action area is defined by the consultation regulations (50 CFR 402.02) as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action."

The environmental baseline does not include any future discretionary Federal activities (that have not yet undergone ESA consultation) in the action area. The species' current status is described in relation to the risks presented by the continuing effects of all previous actions and resource commitments that are not subject to further exercise of Federal discretion. For a new project, the environmental baseline consists of the conditions in the action area that exist before the proposed action begins. For an ongoing Federal action, those effects of the action resulting from past unalterable resource commitments are included in the baseline, and those effects that would be caused by the continuance of the proposed action are then analyzed for determination of effects.

The reason for determining the species' status under the environmental baseline (without the effects of the proposed or continuing action) is to better understand the relative significance of the effects of the action upon the species' likelihood of survival and chances for recovery. Thus if the species' status is poor and the baseline is degraded at the time of consultation, it is more likely that any additional adverse effects caused by the proposed or continuing action will be significant.

The implementing regulations specify that the environmental baseline of the area potentially affected by the proposed action should be used in making the jeopardy determination. Consequently, delineating the action area for the proposed or continuing action is one of the first steps in identifying the environmental baseline. For the lotic environs typical of salmon habitat-related consultations, a watershed or sub-basin geographic unit (and its downstream environs) is usually a logical action area designation. Most habitat effects are carried downstream readily, and many travel upstream as well (*e.g.*, channel downcutting). Moreover, watershed divides provide clear boundaries for analyzing the cumulative effects of multiple independent actions.[30]

C. Determine the Effects of the Action on the Species.

In this step of the analysis, NMFS examines the likely effects of the proposed action on the species and its habitat within the context of the its current status and existing environmental baseline. The analysis also includes an analysis of both direct and indirect effects of the action. "Indirect effects" are those that are caused by the action and are later in time but are still reasonably certain to occur. They include effects on species or critical habitat of future activities that are induced by the action subject to consultation and that occur after the action is completed. The analysis also takes into account direct and indirect effects of actions that are interrelated or interdependent with the proposed action. "Interrelated actions" are those that are part of a larger action and depend on the larger action for their justification. "Interdependent actions" are those that have no independent utility apart from the action under consideration.

[30] National Research Council, *Upstream: Salmon and Society in the Pacific Northwest. National Research Council*, National Academy Press, Washington, D.C., pp. 34, 213 & 359 (1996).

NMFS may use either or both of two independent techniques in assessing the impact of a proposed action. First, NMFS may consider the impact in terms of how many listed salmon will be killed or injured during a particular life stage and gauge the effects of that take's effects on population size and viability. Alternatively, NMFS may consider the impact on the species' freshwater habitat requirements, such as water temperature, substrate composition, dissolved gas levels, structural elements, etc. This second technique is especially useful for habitat-related analyses because, while many cause and effect relationships between habitat quality and population viability are well known,[31] they do not lend themselves to meaningful quantification in terms of fish numbers. Consequently, while this second technique does not directly assess the effects of actions on population condition, it indirectly considers this issue by evaluating existing habitat conditions in light of habitat conditions known to be conducive to salmon conservation.

Though there is more than one valid analytical framework for determining effects, NMFS usually uses a matrix of pathways and indicators to determine whether proposed actions would further damage impaired habitat or retard the progress of impaired habitat toward properly functioning condition. For the purpose of guiding Federal action agencies in making effects determinations, NMFS has developed and distributed a document detailing this method.[32] This document is discussed in more detail below. The levels of effects, or effects determinations, are defined[33] as:

> **"No effect."** Literally no effect whatsoever. No probability of any effect. The action is determined to have "no effect" if there are no proposed or listed salmon and no proposed or designated critical habitat in the action area or downstream from it. This effects determination is the responsibility of the action agency to make and does not require NMFS review.
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> **"May affect, not likely to adversely affect."** Insignificant, discountable, or beneficial effects. The effect level is determined to be "may affect, not likely to adversely affect" if the proposed action does not have the potential to hinder attainment of relevant properly functioning indicators and has a negligible (extremely low) probability of taking proposed or listed salmon or resulting in the destruction or adverse modification of their habitat. An insignificant effect relates to the size of the impact and should never reach the scale where take

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[31] *See* Spence et al., *An Ecosystem Approach to Salmonid Conservation*, ManTech Environmental Research Services Corporation, Corvallis, Oregon (1996).

[32] *See* NMFS, *Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale* (MPI) (1996).

[33] These definitions are adapted from those found in NMFS, *Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale* (MPI) (1996), and; U.S. Fish and Wildlife Service and National Marine Fisheries Service., *Endangered Species Consultation Handbook: Procedures for Conducting Consultation and Conference Activities Under Section 7 of the Endangered Species Act*. U.S. Government Printing Office, Washington, D.C. (1998)

occurs.[34] A "discountable effect" is defined as being so extremely unlikely to occur that a reasonable person cannot detect, measure, or evaluate it. This level of effect requires informal consultation, which consists of NMFS concurrence with the action agency's determination.

"May affect, likely to adversely affect." Some portion or aspect of the action has a greater than insignificant probability of having a detrimental effect upon individual organisms or habitat. Such detrimental effect may be direct or indirect, short- or long-term. The action is "likely to adversely affect" if it has the potential to hinder attainment of relevant properly functioning indicators, or if there is more than a negligible probability of taking proposed or listed salmon or resulting in the destruction or adverse modification of their habitat. This determination would apply when the overall effect of an action has short-term adverse effects even if the overall long-term effect is beneficial. In such instances, NMFS conducts a jeopardy analysis.

The above effects determinations are applicable to individual fish, including fry and embryos. The MPI should be applied at spatial scales appropriate to the proposed action so that its habitat effects on individuals are fully taken into account. For example, if any of the indicators in the MPI are thought to be degraded by the proposed action to the extent that take of an individual fish results, the action is determined to be "may affect, likely to adversely affect." For actions that are likely to adversely affect, NMFS must conduct a jeopardy analysis and render a biological opinion resulting in one of the conclusions below:

"Not likely to jeopardize" and/or "Not likely to result in the destruction or adverse modification of critical habitat." The action does not appreciably reduce the likelihood of species survival and recovery or result in the destruction or adverse modification of its critical habitat.

"Likely to jeopardize" and/or "Likely to result in the destruction or adverse modification of critical habitat." The action appreciably reduces the likelihood of species survival and recovery or results in the destruction or adverse modification of its critical habitat.

D. Consider Cumulative Effects in the Action Area.

The ESA implementing regulations define "cumulative effects" as those effects caused by future projects and activities unrelated to the action under consideration (not including discretionary Federal actions) that are reasonably certain to occur within the action area.[35] Since all future discretionary Federal

[34] "Take" means to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in such conduct." 16 USC §1532(19) (1988).

[35] 50 CFR § 402.02 (1999).

actions will at some point be subject to § 7 consultation, their effects will be considered at that time and are not included in cumulative effects analysis.

E. Jeopardy Determinations.

In this step of the analysis, NMFS determines whether (a) the species can be expected to survive, with an adequate potential for recovery, under the effects of the proposed or continuing action, the environmental baseline and any cumulative effects; and (b) whether the action will appreciably diminish the value of critical habitat for both the survival and recovery of the species. In completing this step of the analysis, NMFS determines whether the action under consultation, together with all cumulative effects when added to the environmental baseline, is likely to jeopardize the continued existence of the listed species or result in destruction or adverse modification of critical habitat.

For the jeopardy determination, NMFS uses the consultation regulations and the MPI analysis method to determine whether actions would further degrade the environmental baseline or hinder attainment of PFC at a spatial scale relevant to the listed ESU. That is, because salmon ESUs typically consist of groups of populations that inhabit geographic areas ranging in size from less than ten to several thousand square miles (depending on the species), the analysis must applied at a spatial resolution wherein the actual effects of the action upon the species can be determined.

The analysis takes into account the species' status because determining the impact upon a species' status is the essence of the jeopardy determination. Depending upon the specific considerations of the analysis, actions that are found likely to impair currently properly functioning habitat, appreciably reduce the functioning of already impaired habitat, or retard the long-term progress of impaired habitat towards PFC at the population or ESU scale will generally be determined likely to jeopardize the continued existence of listed salmon, adversely modify their critical habitat, or both. Specific considerations include whether habitat condition was an important factor for decline in the listing decision, changes in population or habitat conditions since listing, and any new information that has become available.

If NMFS anticipates take of listed salmon incidental to the proposed action, the biological opinion is accompanied by an incidental take statement with reasonable and prudent measures to minimize the impact of such take, and non-discretionary terms and conditions for implementing those measures. Discretionary conservation recommendations may also accompany the biological opinion to assist action agencies further the purposes of habitat and species conservation specified in §§ 7(a)(1) and 7(a)(2).

F. Identify reasonable and prudent alternatives to a proposed or continuing action that is likely to jeopardize the continued existence of the listed species.

If the proposed or continuing action is likely to jeopardize the listed species or destroy or adversely modify critical habitat, NMFS must identify reasonable and prudent alternatives that comply with the requires of § 7(a)(2) and with the applicable regulations. The reasonable and prudent alternative must be consistent with the intended purpose of the action, consistent with the action agency's legal authority

and jurisdiction, and technologically and economically feasible. At this stage of the consultation, NMFS will also indicate if it is unable to develop a reasonable and prudent alternative.

IV. Application Tools Useful in Conducting § 7 Analyses - The Matrix

As previously mentioned, NMFS has developed an analytic methodology to help determine the environmental effects a given action will have by describing an action's effects on PFC.[36] This document includes a *Matrix of Pathways and Indicators* (MPI; often called "The Matrix,") and a dichotomous key for making effects determinations based on the condition of the environmental baseline and the likely effects of a given project. The MPI helps the action agency and NMFS describe current freshwater habitat conditions, determine the factors limiting salmon production, and identify sensitive areas and any risks to PFC. This document only *helps* make effects determination, it does not describe jeopardy criteria per se.

The pathways for determining the effects of an action are represented as six conceptual groupings (*e.g.*, water quality, channel condition, and dynamics) of 18 habitat condition indicators (*e.g.*, temperature, width/depth ratio). Default indicator criteria[37] (mostly numeric, though some are narrative) are laid out for three levels of environmental baseline condition: properly functioning, at risk, and not properly functioning. The effects of the action upon each indicator is classified by whether it will restore, maintain, or degrade the indicator.

The MPI provides a consistent, but geographically adaptable, framework for effects determinations. The pathways and indicators, as well as the ranges of their associated criteria, are amenable to alteration through the process of watershed analysis. The MPI, and variations on it, are widely used in § 7 consultations. The MPI is also used in other venues to determine baseline conditions, identify properly functioning condition, and estimate the effects of individual management prescriptions. This assessment tool was developed for forestry activities. NMFS is working to adapt it for other types of land management, and for larger spatial and temporal scales.

For practical purposes, the MPI analysis must sometimes be applied to geographic areas smaller than a watershed or basin due to a proposed action's scope or geographic distribution. These circumstances necessarily reduce analytic accuracy because the processes essential to aquatic habitats extend

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[36] NMFS, *Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale* (MPI) (1996).

[37] The unmodified "matrix" uses ranges of values for indicators that are generally applicable between species and across the geographic distribution of salmon. The indicators can be, and have been, modified for more specific geographic and species applications.

continuously upslope and downslope, and may operate quite independently between drainages.[38] Such loss of analytic accuracy should typically be offset by more conservative management practices in order to achieve parity of risk with the watershed approach. Conversely, a watershed approach to habitat conservation provides greater analytic certainty, and hence more flexibility in management practices.

V. Conclusion

The NMFS has followed regulations under §§ 7 and 10 of the ESA to develop an analytical procedure used to consistently assess whether any proposed action would jeopardize or conserve federally protected species. There is a legacy of a more than a century of profound human alterations to the Pacific coast drainages inhabited by salmon.[39] The analytical tool described as the MPI enables proposed actions to be assessed in light of the species current status, the current conditions, and expected effects of the action. Proposed actions that fail to conserve fish and their habitats as initially proposed can be redesigned to avoid jeopardy and begin to restore watershed processes. Conservation of listed salmon will depend largely on the recovery of watershed processes that furnish their aquatic habitat.

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[38] L. B. Leopold, *A View of the River*, Harvard University Press, Cambridge, Massachusetts, chapter 1 (1994).

[39] *See* Cone and Ridlington, *The Northwest Salmon Crisis, a Documentary History*. Oregon State University Press, Corvallis, Oregon, pp. 12-21 & 154-160 (1996); W. Nehlsen *et al*., *Pacific Salmon at the Crossroads: Stocks at Risk from California, Oregon, Idaho, and Washington*, Fisheries, Vol.16(2), pp. 4-21 (1991).